

# 2018-19 Iowa STEM Scale-Up Programs

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**FROM IOWANS**  
GOVERNOR'S STEM ADVISORY COUNCIL



<https://goo.gl/cjLBBd>

# CASE - Animal and Plant Biotechnology

Experience industry appropriate applications of biotechnology related plant and animal agriculture through hands-on activities, projects and problems in biotechnology. Research and experimental design will be highlighted in industry-appropriate investigations that involve micropipetting, bacterial cultures and transformations, electrophoresis, and the polymerase chain. [www.case4learning.org](http://www.case4learning.org)

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Grade levels: 10-12  
In school



# CASE Environmental Science Issues

Investigate areas that include ecosystem management, sustainable agriculture, energy choices, and pollution. Students will research, investigate, experiment, and document a project, and communicate solutions to peers and members of the professional community.

[www.case4learning.org](http://www.case4learning.org)

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Grade levels: 10-12  
In school



# Computer Science Principles

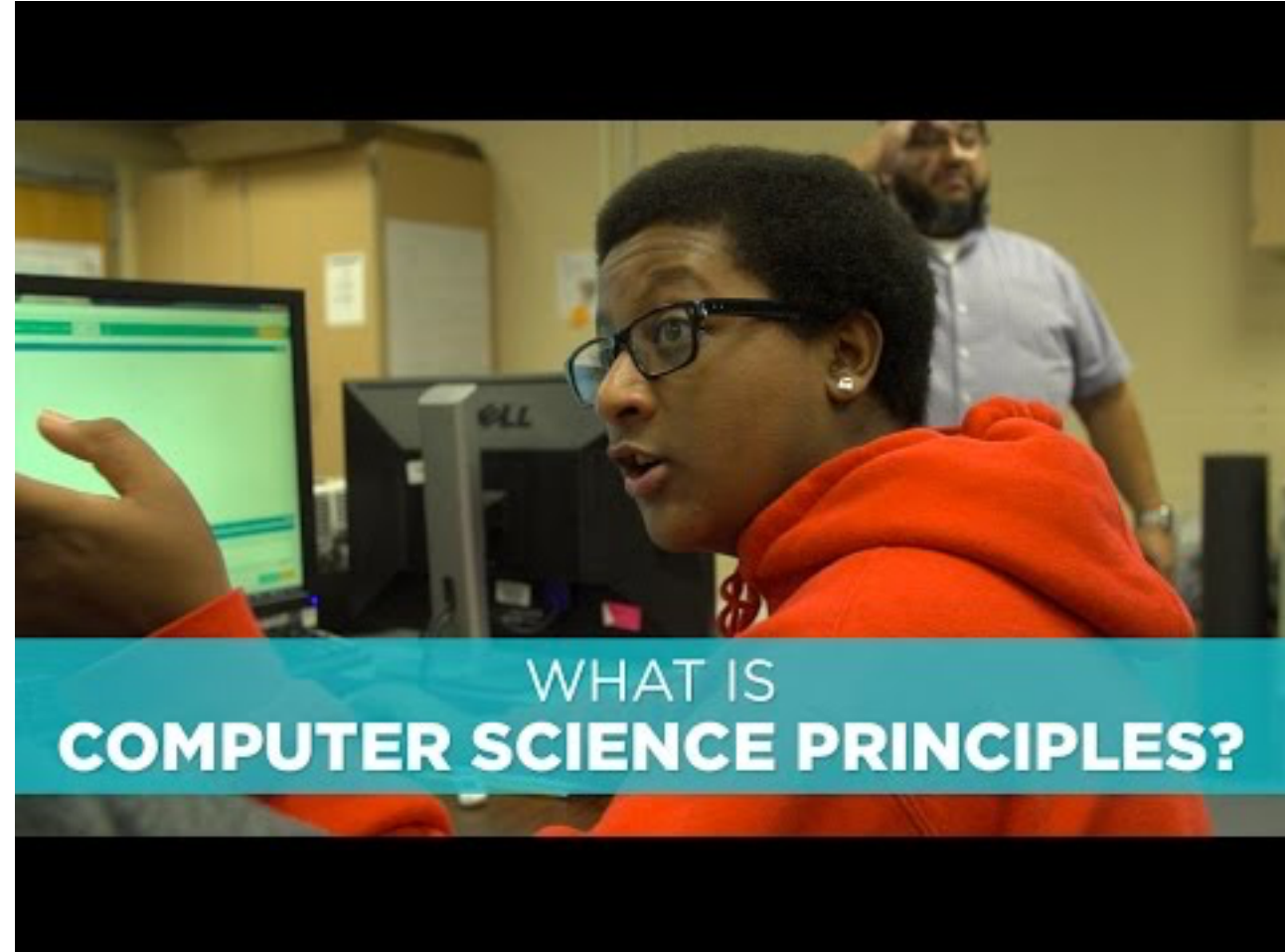
A year-long Code.org course that aligns with CSTA standards and 21st Century Learning Skills. It can be delivered as an Advanced Placement course. Teachers need no prior computer technology experience to qualify for training.

[www.code.org/educate/csp](http://www.code.org/educate/csp)

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Grade levels: 10-12  
In school





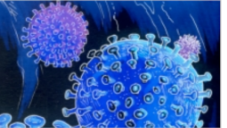









# Engineering Everywhere

Helps students think creatively and solve globally relevant engineering challenges during out-of-school programs. Each unit has an introduction to the engineering process, culminating design challenge, science and mathematics standards, and 21st Century Learning Skills.

[www.eie.org/engineering-everywhere](http://www.eie.org/engineering-everywhere)

Grade levels: 6-8  
Out of school

<b>Vertical Farms</b>  Growing Up 6-8 L Grades Afterschool Agricultural Engineering	<b>Prosthetic Tails</b>  Go Fish 6-8 L Grades Afterschool Biomechanical Engineering	<b>Pandemic Response</b>  Outbreak Alert! 6-8 L Grades Afterschool Biomedical Engineering	<b>Bioinspired Gear</b>  It's in the Bag 6-8 L Grades Afterschool Materials Engineering
<b>Timers</b>  It's About Time 6-8 L Grades Afterschool Mechanical Engineering	<b>Bioplastics</b>  Plants to Plastics 6-8 L Grades Afterschool Chemical Engineering	<b>Urban Landscapes</b>  Don't Runoff 6-8 L Grades Afterschool Environmental Engineering	<b>Insulated Homes</b>  Here Comes the Sun 6-8 L Grades Afterschool Green Engineering
<b>Safety Helmets</b>  Put a Lid on It 6-8 L Grades Afterschool Biomechanical Engineering	<b>Ice Cream</b>  Food for Thought 6-8 L Grades Afterschool Process Engineering		

# Making STEM Connections

Activities that help students connect STEM to their daily lives and develop competencies essential to Iowa's future workforce. Grounded in making, safety, upcycling, creative constraints, art, and reinventing technologies. Lessons build on NGSS standards, reflect Iowa Common Core, and include National CORE Art Standards. [www.sciowa.org/makingstemconnections](http://www.sciowa.org/makingstemconnections)

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Grade levels: K-9  
In school or out of school



# Pint Size Science

Four hands-on modules: one introductory unit and three chosen by the educator. Features Iowa Early Learning Standards/GOLD Objectives, NGSS, Iowa Common Core math and literacy and 21st Century Learning Skills. Includes kit materials, curriculum guides, website and webinar support. [www.sciowa.org/pss](http://www.sciowa.org/pss)

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Grade levels: PreK-K  
In school or out of school





# Project Lead the Way Gateway

## Computer Science for Innovators and Makers

Using real-world scenarios, students use the design process, which includes defining the problem, generating concepts, and designing and presenting a solution. Aligns to NGSS, Iowa Common Core for Mathematics and ELA, and CSTA Standards. [www.pltw.org](http://www.pltw.org)

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Grade levels: 6-8  
In school



# PowerTeaching Math

Includes active instruction, team practice, formative and formal assessments, feedback and motivation, and a designated PowerTeaching coach. Contains Iowa Common Core Mathematics Standards and 21st Century Learning Skills. [www.successforall.org](http://www.successforall.org)

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Grade levels: 6-8  
In school

I kind of like it, the  
math is not my favorite  
but I like working in  
groups and with points.  
It is a good way to  
learn to work with  
different people.





# Ramps and Pathways

Explore the engineering process and mathematics of spatial thinking and geometry through construction of marble runs; mathematics and literacy skills through data collection; physics of force and motion through conversations and retesting; and 21st Century Learning Skills related to creation and innovation.

[www.rampsandpathways.org](http://www.rampsandpathways.org)

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Grade levels: PreK-2  
In school or out of school



# STEM in Action

With options in Life, Earth and Physical Sciences, each educator chosen kit (5 for PreK, 9 for K-2, 9 for 3-5) is formatted into small, manageable bits of time with limited consumable items. Available in English and Spanish.

[www.hand2mind.com/steminaction](http://www.hand2mind.com/steminaction)

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Grade levels: preK-5  
In school or out of school



# Important Dates To Remember:

- ★ January 22, 2018 - Applications open for 2018-19 Scale-Up Programs
- ★ March 6, 2018 - Applications close for 2018-19 Scale-Up Programs



## Teacher-Leader, Instructional Coaches in STEM

January 5, 2018

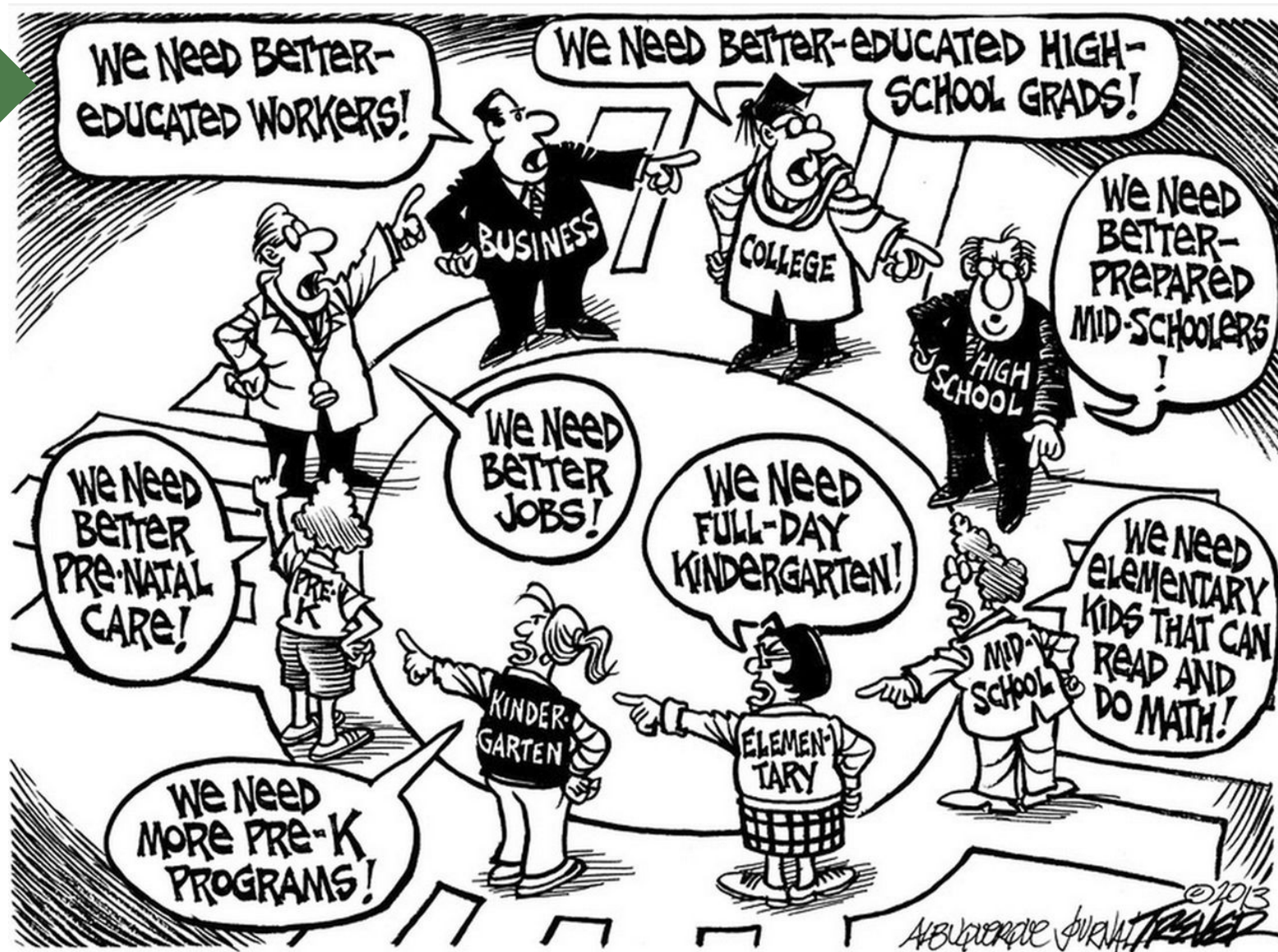


IOWA  
**WORKFORCE**  
DEVELOPMENT

A proud partner of the **AmericanJobCenter** network









## **Vision:**

A Future Ready Iowa that prepares individuals for dynamic careers and lifelong learning, meets employer needs, grows family incomes and strengthens communities.

Future Ready Iowa helps more Iowans attain the “new minimum” of high-quality education and training beyond high school by aligning education, workforce, and economic development resources.







# Goal

## 70%

of Iowa's workforce will have  
post-secondary education,  
training or a credential of value by

## 2025

# 38,228 Students

2004-2005 Academic Year  
(started as HS freshman 2001-2002)

**33,294**

graduated from high school



**post-secondary degree through FY 2013**

of those that **did** receive:

**75.5%**

were employed\*  
with an annual median wage of:

**\$33,554**

**4,934**

**did not** graduate from high school



**65.6%**

were employed\*  
with an annual median wage of:

**\$14,656**

\*Includes State Unemployment Insurance covered employment  
Source: Iowa Department of Education MIS, Iowa Workforce  
Development Unemployment Insurance Wage Records

# 2.9%

Current Iowa  
Unemployment  
Rate

**November 2017**

tied for the 5<sup>th</sup> lowest rate  
in the country

# 3.6%

2015 Average  
Unemployment Rate

# 3.9%

2016 Average  
Unemployment Rate

# 61,721

Unemployed Persons  
in 2015

# 66,889

Unemployed Persons  
in 2016

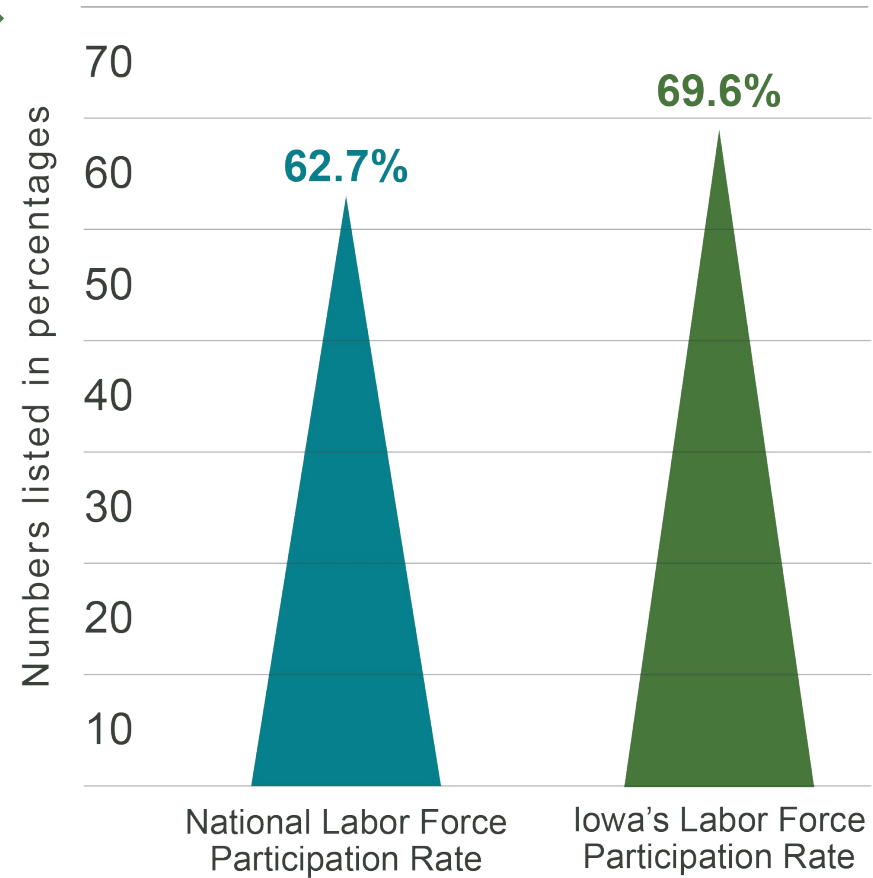
Source: Local Area Unemployment Statistics, BLS

# Iowa's Labor Force Participation

# 6.9%

Greater than the National Average

Source: BLS, December 2016 (seasonally adjusted)



**Iowa ranks 2<sup>nd</sup> in the nation**  
behind North Dakota

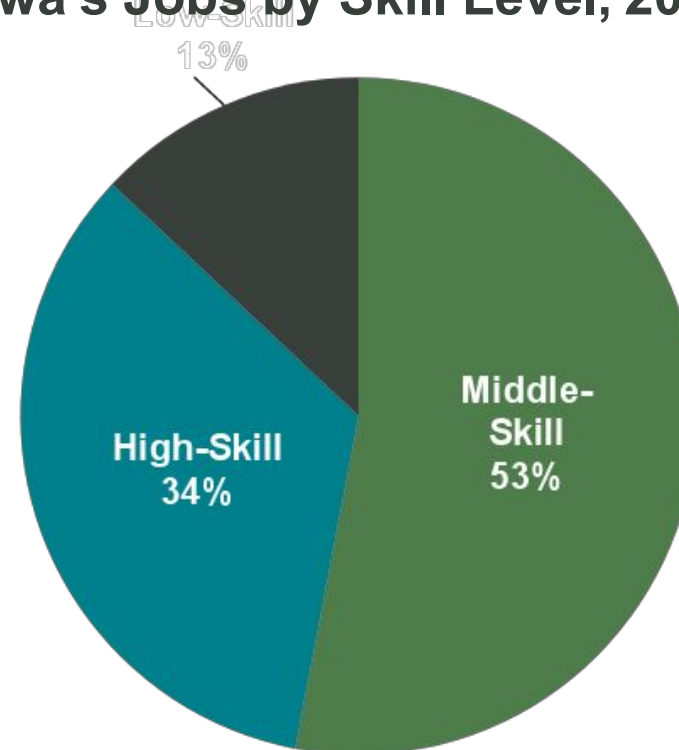


IOWA'S  
**JOBS BY SKILL  
LEVEL**

**53%**

are Middle-Skill Jobs

**Iowa's Jobs by Skill Level, 2016**



Source: 2016 Occupational Employment Statistics, Labor Market Information Division, Iowa Workforce Development

Population age 25 years or older:

**3.8%**

Trade Certificates

**2.6%**

Vocational Training

**16.3%**

Associate Degree

**23.5%**

Undergraduate Degree

**11.9%**

Post-Graduate Degree

## Education Level

**58.1%**

Total Iowans with education or  
training beyond High School



U.S. Census Bureau, American Community Survey 1-Year Estimate

# Future Ready Iowa Alliance

**Task:** Create a strategic plan to reach ambitious goal of 70% of Iowa's workforce having education or training beyond high school by 2025



# Future Ready Iowa Alliance Recommendations

1. Establish Future Ready Iowa Last Dollar Scholarship and Iowa Grant Program to help more Iowans secure high-demand jobs.
2. Develop Future Ready Iowa Employer Innovation Fund to create private/public partnerships that accelerate the regional workforce talent pipeline.
3. Expand high-quality, work-based learning experiences to all students.
4. Identify early academic approaches that effectively prepare all students for a changing world.
5. Engage the business community, education and all workforce stakeholder in a local employment strategy.

# Future Ready Iowa Website

- Connects job seekers to tools for finding education, training and jobs
- Current local Labor Market Information
- Offers assessment tool for career recommendations
- Provides education and training opportunities and financial resources for paying for school
- Connects job seekers to open jobs in Iowa

futurereadyiowa.gov





# Future Ready Iowa at the Fair

- Community Art Station Chalkboard asking “How are You Getting Your Future Ready”
- Selfie Station with props for jobs that were available with a Registered Apprenticeship
- Multiple giveaways including T-shirts and Fidget Spinners
- More than 2,600 emails collected for a Future Ready Iowa mailing list



# Minority Unemployment & Outreach Standing Committee

Standing Committee of the  
**State Workforce Board**

Chaired by Andy Roberts

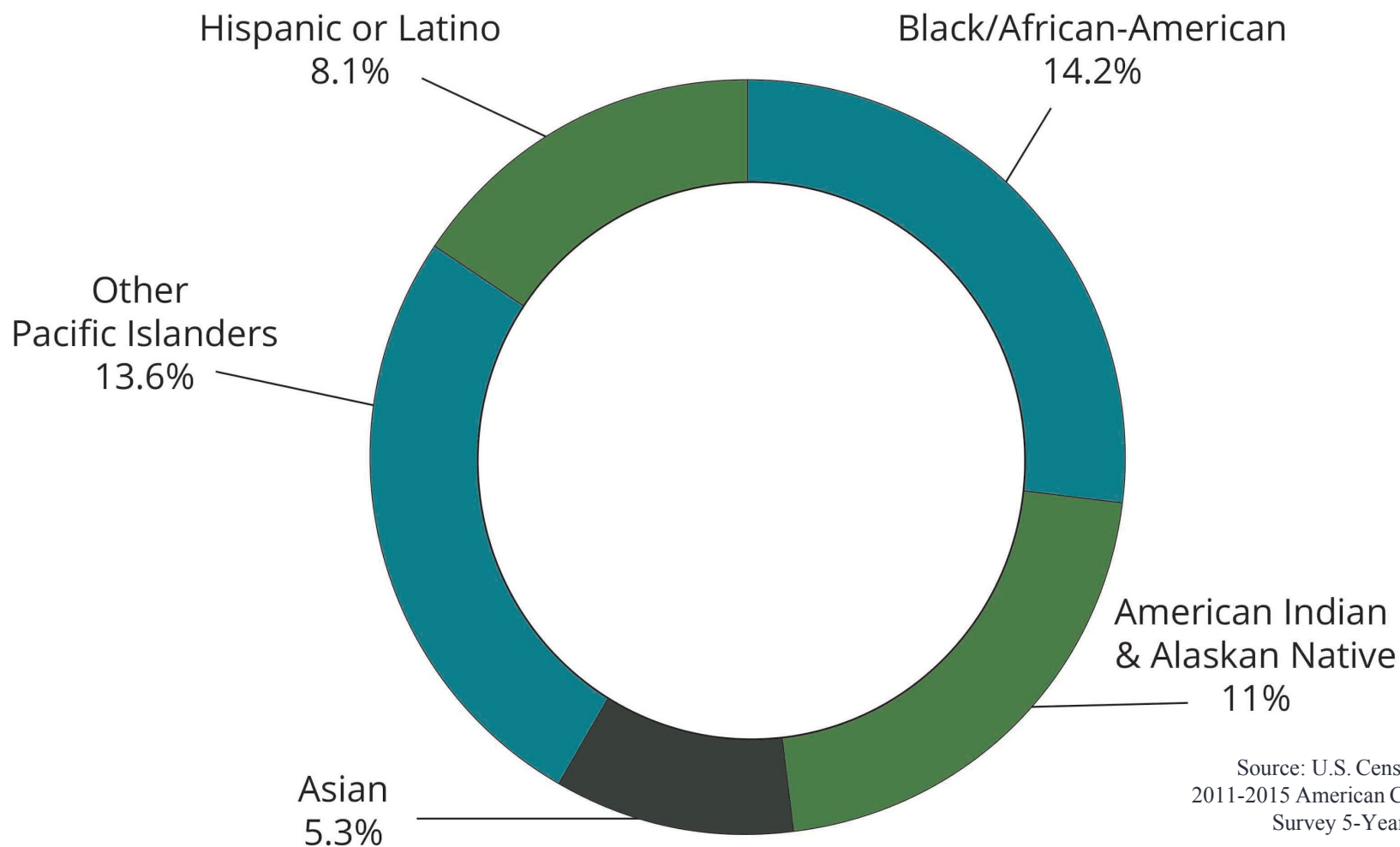
**Goal:** Reduce unemployment rate in minority communities by five percent in five years

Develop strategic plan to address minority unemployment that aligns with and supports Future Ready Iowa Alliance recommendations

## **Pilot Counties**

- Black Hawk
- Dubuque
- Polk
- Pottawattamie

# Unemployment Rates by Race



Source: U.S. Census Bureau,  
2011-2015 American Community  
Survey 5-Year Estimates



# Registered Apprenticeship

Iowa Statistics as of September 2017

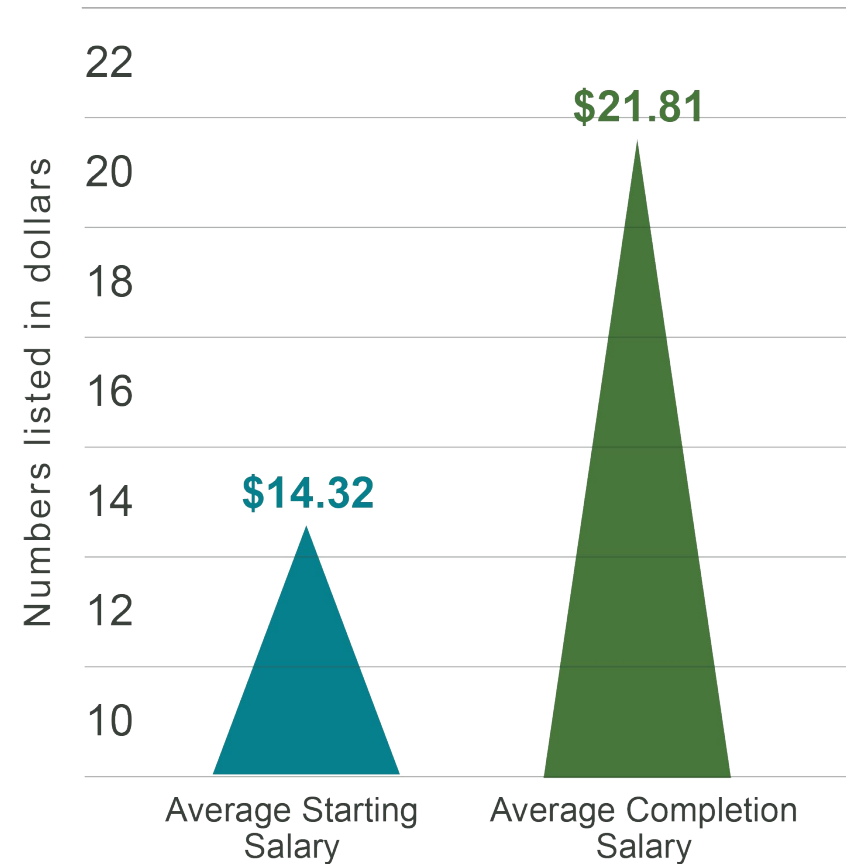
**827** Active Registered Apprenticeship Programs

**125** Number of New Registered Apprenticeship Programs

**1,429** Total Number of Apprentices who Completed Registered Apprenticeship Programs

**8,655** Total Number of Active Apprentices

**3,863** Number of New Registered Apprentices added since October 1, 2016



# Registered Apprenticeships

Iowa recently received a

# \$1.8 mil

grant to expand  
Registered Apprenticeship  
Opportunities

Aligns with  
**Future Ready Iowa**  
Initiative



Apprenticeship**USA**

- Goal: To double the number of registered apprentices in Iowa over the next five years
- New opportunities in diverse industries:
  - Health care
  - Advanced manufacturing
  - Information technology
- Focus on diverse populations:
  - Women
  - Minorities
  - Underrepresented Iowans

# Registered Apprenticeship Expansion Grant

Total Registered  
Apprentices: **256**

Male: 239  
Female: 17

16-24: 24  
25-54: 214  
55+: 18

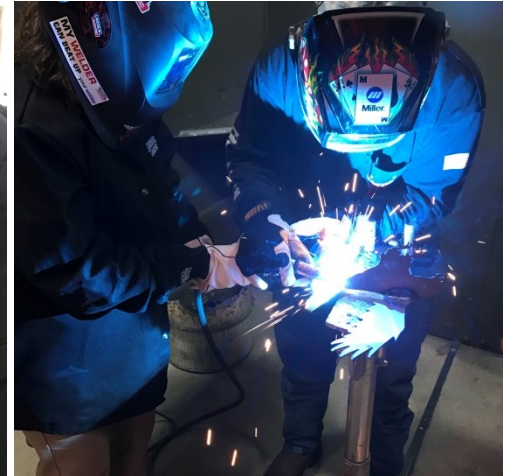
Veterans: 30

Hispanic: 12

Black/African American: 65

New Registered Apprenticeship  
Programs created: 7

Number of Programs Expanded: 2





# Thank You

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Follow Director Townsend  
on Twitter  
[@BethTownsendIWD](https://twitter.com/BethTownsendIWD)  
[#FutureReadyIA](https://twitter.com/BethTownsendIWD)



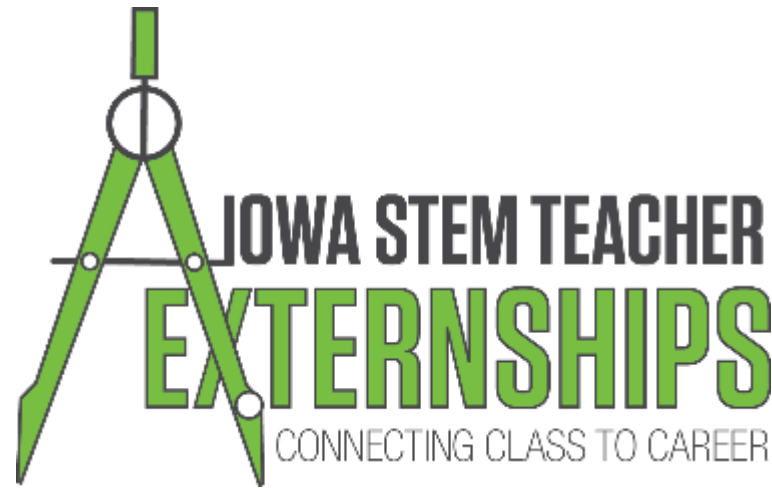
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# Iowa STEM Teacher Externship Program

*for teachers of Mathematics, Science and Technology*



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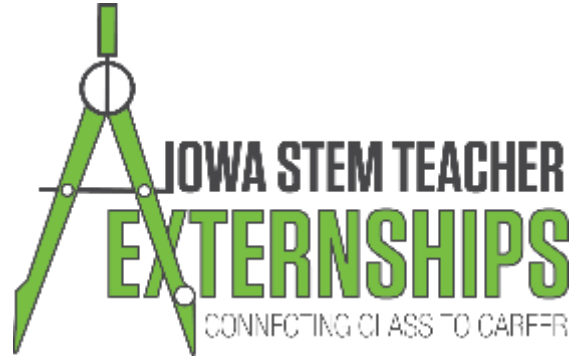
# The Externships basics:

- Six week summer partnerships between teachers of math, science & technology and local businesses and agencies.
- Teachers apply what they teach in classroom to real-world challenges by contributing to company operations.



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- Created to address the requests of Iowa students “When am I ever going to use this?”
  - Relevance, real-world application
- Launched in 2009 with 10 Externs Beyond student internships- impact the teachers to inspire the students
- Not just a job shadow- hosts put the teachers to work

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# Benefits

- *Businesses of Iowa*
  - High level projects, unique point of view
  - Build connections to schools
  - Build STEM literacy in their community
- *Teachers of Iowa*
  - Content application, classroom relevance
  - What do students need to be STEM ready graduates?
    - content skills, employability skills and technological literacy
- *The students of Iowa*
  - *Inspired teachers inspire students*



*Michele Bowles Science teacher,  
Western Dubuque High School*

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# Making it Happen

- *The Match*

- Teachers are carefully selected for local hosts based on interest and skills.
- Program coordinates initial meeting



*Jared Diers, Industrial Technology  
teacher, Drexler Middle School*

- *The Externship*

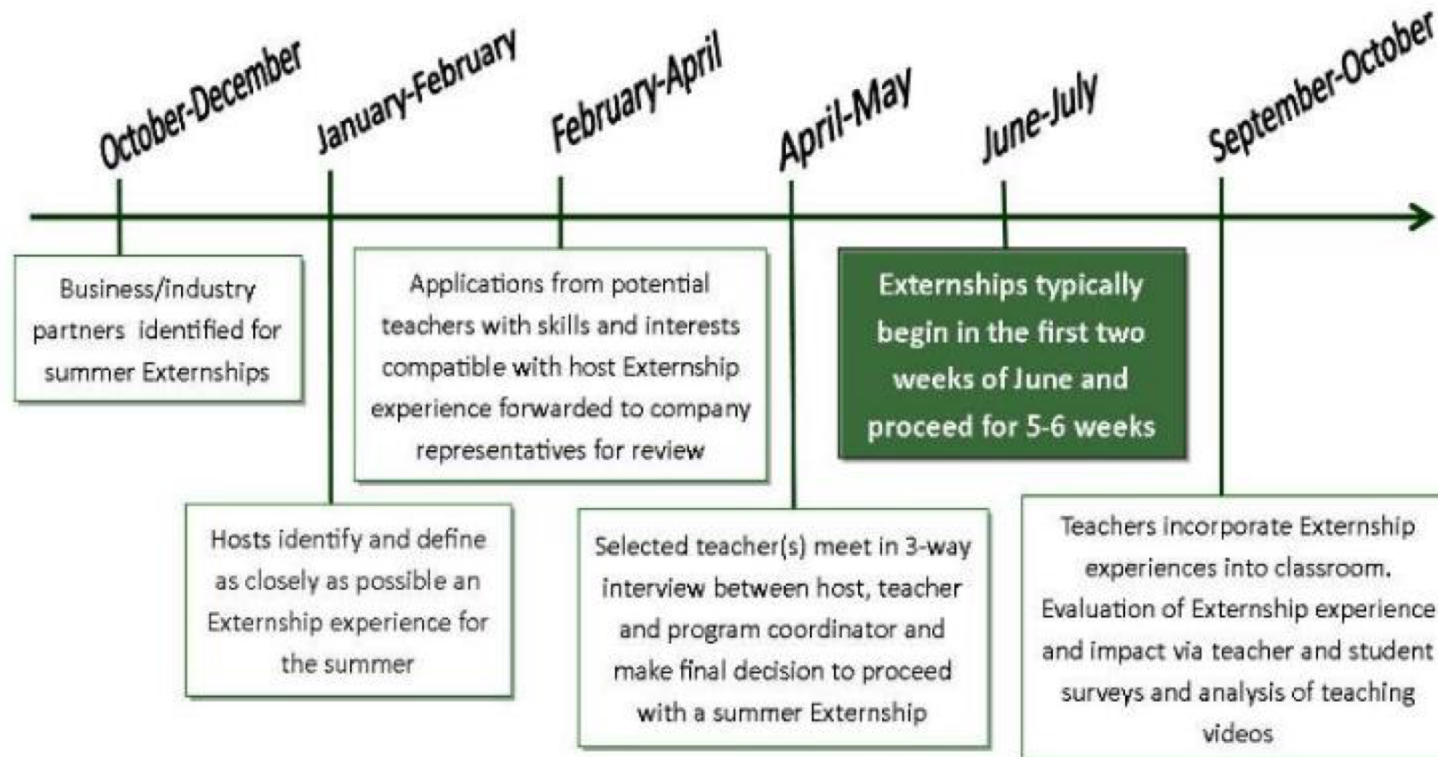
- Max \$4,500 stipend to teacher (\$150/day for up to 30 days), program routes contributions via tax-deductible foundation
- 1 hour graduate credit via University of Northern Iowa
- Two hours of AEA license renewal credit (optional)
- Continual guidance by program mentor
  - Communication with host
  - Classroom implementation
  - Blog
  - Brainstorm with other teacher externs

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# Making it Happen: Timeline

A unique school-business partnership where STEM teachers work in local businesses for five-to-six full time weeks during the summer.



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# STEM Externships in Iowa



*Lacey Wolter, Science teacher, Cascade Jr./Sr. High School*



**JOHN DEERE**



*Amanda Goranson, Mathematics & Computer Science teacher, Dubuque Senior High School*



*Melisa Reilly, Physical Science teacher, West High School, Waterloo*



*Dirk Homewood, Math teacher, Cedar Falls High School*



*Jeff Orvis, Math Computer Programming Teacher, Waverly-Shell Rock High School*



*Ryan Bergan, Industrial Technology teacher, West Central CSD, Maynard*



*CeAnn Palmer, Computer Science teacher, Cascade High School*



*Andrew Reinert, Science teacher, Dubuque Senior High School  
Project: Cost and Time Analysis*

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# How to apply?

To apply

<https://iowastem.gov/externships/apply>.

For additional information.

[Externships@IowaSTEM.gov](mailto:Externships@IowaSTEM.gov)

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# Iowa STEM BEST

Deb Frazee - Southwest Regional Manager

Kristine Bullock - Southeast Regional Manager

# STEM BEST Overview

- Goal
  - Unite business and education to build a strong STEM pipeline based on authentic, real-world experiences
- Attributes
  - Education driven by local industry need
  - Rigorous, relevant, dynamic curriculum
    - Allows mastery of core standards while being informed by changing workforce/industry needs
  - Authentic partnerships
    - Business, non-profits, government, higher education
    - Multi-dimensional

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# STEM BEST Overview

- Funding
  - Up to \$25,000 per collaborative with 1:1 match during award period
- Timeline
  - Application - late spring through late summer
    - Application is <10 pages and completed by the participating district/private school
    - Commitment vs support letter
  - Implementation - October 2018-June 2019



# STEM BEST Overview

- Commitment
  - Year 1 - Oct 2018 - June 2019 planning/implementation
  - Year 2 - July 2019 - June 2020 progress report

# Current Models

- **FY15**
  - Bettendorf/Pleasant Valley, Iowa BIG, Kirkwood Community College, Northeast, Rock Valley
- **FY16**
  - Iowa BIG North, Des Moines Hoover, Davenport West
- **FY17**
  - Assumption HS, Boone, Fort Madison, IKM-Manning, Muscatine, North Cedar Elementary, Spencer, Story County Consortium, Waukee, West Delaware
- **FY18**
  - Alburnett, Albia, Ankeny, Atlantic, Cedar Falls, Chariton, Iowa BIG North, Davenport West, IKM-Manning MS, Iowa City, Marshalltown, Muscatine, Newton, North Iowa, Oelwein, Southwest Valley, Spirit Lake, West Liberty MS

# Program Highlight

- Muscatine CC and MCSD Elementary Schools

CATEGORIES - STANDARDS	4 <sup>th</sup> & 5 <sup>th</sup> GRADE STANDARDS	MCSD 6th-12	MCC	BUSINESSES
Earth and Human Activity	4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.	Energy & Env't, Ag	Ag	Monsanto, MPW, Van Meter
Earth and Human Activity	4-ESS3-2. Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.*	Energy & Env't, Ag	Ag	Monsanto, ATEEC, Bridgestone, MPW
Matter and its Interactions	5-PS1-2. Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing	Chemistry	Chemistry	MPW

# Program Highlight

- Muscatine CC and MCSD Elementary Schools

EVALUATION OUTCOMES and INDICATORS for STEAM into MCC				
Objective 1: Develop <i>STEAM into MCC</i> curriculum that meets the 12 dimensions and can be replicated.				
Outcomes	Indicators	Data Source	Interval	Target
Partner with business, industry, schools and college to develop curriculum content.	<ul style="list-style-type: none"><li>• The # of business, industry, school and college representatives who participate in curriculum development.</li><li>• The #/% of representatives who report participation was/was not useful in achieving program goals.</li></ul>	Participants and meeting minutes on file. Survey (Likert scale), interviews.	11/2016 to 06/2017	Business, industry, schools, college. Participant 90% satisfaction level.
Develop project-based, industry-inspired teaching modules.	<ul style="list-style-type: none"><li>• The # of STEAM modules developed.</li></ul>	# of modules on file	01/2017 to 06/2017	Minimum 9 modules developed on time and within budget.
Develop STEAM into MCC website for teachers and college	<ul style="list-style-type: none"><li>• Develop website.</li><li>• Develop video of after-school program.</li></ul>	STEAM into MCC website	07/2017 to 07/2018	Minimum 100 educators visit website,

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# Program Highlight

- Muscatine CC and MCSD Elementary Schools

Objective 2: Inspire increased student attitude and engagement towards STEAM.				
Conduct pre- and post "Common Instrument" assessment	<ul style="list-style-type: none"><li>• Pre- module assessment of student attitude and engagement.</li><li>• Post-module assessment of student attitude and engagement.</li><li>• Educators gather assessment data regarding student learning outcomes, motivation and retention.</li></ul>	Pre-and post-scores	01/2017 to 06/2017	25% increase between pre- and post-scores.
Conduct Children's Curiosity Scale	<ul style="list-style-type: none"><li>• Conduct scale at beginning of program.</li><li>• Conduct scale at end of program.</li></ul>	Pre-and post - scores	01/2017 to 06/2017	25% increase between pre- and post-scores.
Increase number of students who participate in community programs after STEAM into MCC	<ul style="list-style-type: none"><li>• Set benchmark numbers from 2016 and monitor enrollment in programs.</li></ul>	Monitor benchmark enrollment numbers compared to 2017 numbers.	08/2017	25% increased enrollment in STEM-based offerings

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# Program Highlight

- Muscatine CC and MCSD Elementary Schools

Objective 3: Engage business/industry with STEAM curriculum development and K-14				
STEAM Advisory group informs curriculum/ program development for STEAM into MCC.	<ul style="list-style-type: none"><li>• Advisory group reviews assessment data, learning outcomes, and evaluator feedback.</li><li>• The #/% of business facilitators who report curricula was/was not useful.</li></ul>	Review of assessment data	06/2017 to 08/2017	Changes to program made based on data. Business facilitators 90% satisfaction level.
Inventory of all STEAM offerings and pathways from K-14.	<ul style="list-style-type: none"><li>• Complete an asset map for all STEM offerings K-14.</li></ul>	Asset map	01/2017 to 08/2017	Completed asset map. Shared on website.
Develop new STEAM opportunities informed by business/ industry and student input.	<ul style="list-style-type: none"><li>• Identify targeted student populations, based on asset map.</li><li>• Collaborate with existing providers to expand offerings.</li></ul>	Schedule of course/ program offerings	06/2017 to 12/2017	25% increase in offerings

# District Expansion of BEST

- IKM-Manning (FY17 HS and FY18 MS)
  - Expansion of age group with new program model
  - MS based on makerspace and business innovation
  - HS model involves business partners in the classroom and students visiting business
  - Driven by educators and community members (“HS is too late”)







FINDING INNOVATIVE REASONS 2 EXCEL  
EST 2017  
**STEM BEST**  
IKM-MANNING

## How Can Businesses Help?

- Be a guest speaker/mentor for our class
- Provide a problem/project for associates to work on
- Open your business for visits
- Give your suggestions

Contact FIRE Facilitators TODAY

LUANN LANGE  
llangel@ikm-manning.k12.ia.us

JENNY LINDE  
jlinde@ikm-manning.k12.ia.us

712-655-3781

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# Student Reflection:

“ School translates to careers now”

“We are connected to our community...”

“Wish we had this earlier in my school grades”

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# Business Reflection

“This is a deeper more meaningful investment in our futures”

“What better investment than in our future employees--we are defining a quality worker by sharing our experiences”

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# Questions?

- Kristine Bullock
  - [kristine-bullock@uiowa.edu](mailto:kristine-bullock@uiowa.edu)
  - 319-467-1192
- Deb Frazee
  - [frazee@swcc Iowa.edu](mailto:frazee@swcc Iowa.edu)
  - 712-370-4358
- <https://iowastem.gov/STEMBEST>





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A green rectangular box in the bottom right corner contains the "Greatness STEM From Iowans" logo in white text. The text is stacked vertically: "GREATNESS" at the top, "STEMS" in the middle, and "FROM IOWANS" at the bottom, all in a bold, sans-serif font.

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Iowa Department of  
Education  
Coaches' Update

January 2018

# Mathematics Update

April Pforts

[april.pforts@iowa.gov](mailto:april.pforts@iowa.gov)

# Mathematics Coaching Networks & Communities

- Coaching Network - Math [Sign-up](#)
- [Website](#)

## Communities of Learning:

- a. Standards* - IA Core Advocates [Sign-up](#)
- b. Instruction* - Principles to Actions [Sign-up](#)
- c. Numeracy* - Number Sense - [Sign-up](#)

[Iowa Core Website](#)



# Basketball Data Analytics Battles

This is a project to get students of all ages to find an interest in the growing field of big data.

With nearly every industry integrating big data, we created "Data Analytics Battles" around topics of interests to children to get them to try out data analytics.

- [Website and Registration](#)
- January 31, 2018: Registration Deadline

# Science Update

Kris Kilibarda

[kris.kilibarda@iowa.gov](mailto:kris.kilibarda@iowa.gov)

# IOWA SCIENCE COACHING NETWORK

## WHO ARE WE?

We are a network of instructional coaches. We believe students should be engaged in the Science and Engineering Practices and Crosscutting Concepts in deeply learning scientific phenomena and solving engineering problems. As a network, we will learn from and share with each other so we can effectively support science teaching and learning.

---

[bit.ly/scinetwork](https://bit.ly/scinetwork)

[Google Community](#)

# Iowa Science Standards

## Professional Learning

### Statewide face-to-face & blended models

- Overview of the standards
- Designing phenomenon-based coherent units
- Gathering evidence of student learning

### AEA-developed

- Iowa Science Standards for Instructional Coaches
- Supporting Student Talk for Instructional Coaches

### In development

- Evaluating Instructional Materials (spring 2018)
- Administrator Toolkit (summer 2018)
- Science Literacy (fall 2018)





# Iowa Science Standards

## New or Updated Resources

- [Iowa Core Science Standards Website](#)
- [Iowa Core Educator Resources](#)
- Facebook Pages
- Google Communities ([example](#))



# Computer Science Update

Rita Martens

[rita.martens@iowa.gov](mailto:rita.martens@iowa.gov)

# Computer Science Education Work Group

Issued final report November 1, 2017

- Work group required by SF 274
- Established how computer science professional development fund will meet goals
- Fund distributed through a competitive grant process
- Districts that receive the fund must “offer computer science and expand the reach and rigor of math and computer science”
  - Example: District might require a fourth year of math or three years of math and a computer science course for graduation
- CS courses could fulfill math and science credit after the mathematics and science standards are met

# CS Science Review Team will convene

- Team includes 30 educators, entrepreneurs, and business representatives
- Co-chairs: **Ann Wiley**, Instructional Technology Coordinator, Johnston CSD, and **Bennett Brown**, Teacher, Iowa City CSD
- Team must use the [K-12 Computer Science Framework](#) as a guiding document



# CS Science Review Team will convene

- First meeting Jan. 16, monthly meetings through May
- Will review other state standards aligned to K-12 Framework
- Will review existing standards associated with current CTE, AP, and PLTW computer science courses
- Will survey the field to gather input on CS standards
- Will conduct public forums to gather face-to-face input
- Will offer standards recommendations to the State Board (hopefully in June)